



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

---

**Date:** July 1, 2004

**In reply refer to:** P-04-04 and -05

Mr. Harry Armen  
President  
American Society of Mechanical Engineers  
Three Park Avenue  
New York, New York 10016-5990

---

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendations in this letter. The Safety Board is vitally interested in these recommendations because they are designed to prevent accidents and save lives.

These recommendations are derived from the Safety Board's investigation of the rupture of a pipeline owned and operated by Enbridge Pipelines, LLC near Cohasset, Minnesota, on July 4, 2002, and are consistent with the evidence we found and the analysis we performed.<sup>1</sup> As a result of this investigation, the Safety Board has issued six safety recommendations, two of which are addressed to the American Society of Mechanical Engineers. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendations.

About 2:12 a.m., central daylight time, on July 4, 2002, an Enbridge 34-inch-diameter steel pipeline ruptured in a marsh west of Cohasset, Minnesota. Approximately 6,000 barrels (252,000 gallons) of crude oil were released from the pipeline as a result of the rupture. No deaths or injuries resulted from the release. The cost of the accident was approximately \$5.6 million, which includes the cost of cleanup and recovery, value of lost product, and damage to the property of the pipeline operator and others. The National Transportation Safety Board determines that the probable cause of the July 4, 2002, pipeline rupture near Cohasset, Minnesota, was inadequate loading of the pipe for transportation that allowed a fatigue crack to initiate along the seam of the longitudinal weld during transit. After the pipe was installed, the fatigue crack grew with pressure cycle stresses until the crack reached a critical size and the pipe ruptured.

---

<sup>1</sup> For additional information, see National Transportation Safety Board, *Rupture of Enbridge Pipeline and Release of Crude Oil near Cohasset, Minnesota, July 4, 2002*. NTSB/PAR-04/01 (Washington, DC: NTSB, 2004).

At the time Enbridge purchased the pipe that ruptured in this accident, the pipeline industry was aware that thin-wall, large-diameter pipe (such as the 109:1 diameter to wall thickness ratio pipe that ruptured in this accident) was particularly susceptible to cyclic stresses encountered during transportation, especially by rail, and that such stresses could lead to the initiation of fatigue cracking in the pipe unless the pipe was properly loaded and transported. Welded areas were also known to be the areas most susceptible to fatigue crack initiation during transportation.

American Society of Mechanical Engineers (ASME) code B31.8, 2003 edition, *Gas Transmission and Distribution Piping Systems*, section 816, contains an exemption that allows the installation of pipe that may not have been loaded and transported in accordance with the appropriate American Petroleum Institute (API) railroad or marine recommended practice with no restriction on when the transportation took place. The exemption allows a hydrostatic pressure test in lieu of compliance with the API recommended practices. The exemption requires a hydrostatic pressure test for a minimum of 2 hours at higher than normally required test pressures. Even though the Federal pipeline safety regulations take precedence in cases of a conflict or apparent conflict with any industry guidance, the Safety Board is concerned that the ASME B31.8 piping code may lead pipeline operators to erroneously believe that pressure testing exposes all fatigue cracks initiated during transportation and verifies the integrity of pipe that may not have been loaded and transported in accordance with API standards.

Pipe shipped by marine transportation has also exhibited transportation-related failures, but the pipeline safety regulations have no requirement that a standard be followed when pipe is transported on a marine vessel. The API recommended practice for transportation of pipe on marine vessels, API RP 5LW, was first issued in 1975 as API RP 5L5. In addition to 9 fatigue failures attributed to rail transportation in a 1988 metallurgical study,<sup>2</sup> 17 fatigue failures were attributed to pipe transported by ship that failed during hydrostatic testing between 1976 and 1987 while the recommended practice was available to the pipeline industry. The Safety Board concluded that there is a potential risk of pipe damage due to fatigue crack initiation during marine vessel transportation of pipe, similar to the risk during rail transportation, for both hazardous liquid and natural gas pipelines.

Based on the foregoing information, the National Transportation Safety Board makes the following safety recommendations to the American Society of Mechanical Engineers:

Amend ASME B31.8, *Gas Transmission and Distribution Piping Systems*, section 816, to remove the provision that pressure testing may be used to verify the integrity of pipe that may not have been transported in accordance with the American Petroleum Institute's recommended practices for transportation of pipe by railroad or marine vessels. (P-04-04)

---

<sup>2</sup> Bruno, T.V., "Transit Fatigue of Tubular Goods," *Pipe Line Industry*, July 1988, pp. 31-34.

Amend ASME B31.4, *Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids*, section 434.4, to require the use of the American Petroleum Institute's recommended practice RP 5LW for marine transport of pipe. (P-04-05)

The Safety Board also issued safety recommendations to the Research and Special Programs Administration and the American Petroleum Institute. In your response to this letter, please refer to Safety Recommendations P-04-04 and -05. If you need additional information, you may call (202) 314-6177.

Vice Chairman ROSENKER, and Members GOGLIA, CARMODY, and HEALING concurred in this recommendation. Chairman ENGLEMAN CONNERS did not participate.

By: Mark V. Rosenker  
Vice Chairman